

REMARKS

Introduction

In response to the Office Action dated July 9, 2007, Applicants have amended claims 1, 13, 23, and 24. Claims 5, 8, 9, 18, and 22 have been cancelled. Claims 26-32 have been added. Support for claim 1 is found in, for example, Paras. [0064] and [0067]; Figs. 3A and 3B. Support for claim 13 is found in, for example, originally filed claims 18 and 22; Para. [0064]; and Figs. 3A and 3B. Support for new claims 26-32 is found in, for example, Figs. 3A and 3B. Though “circularly-shaped” cathode/target assembly is used throughout the specification, it is clear from Figs. 3A and 3B that the magnetron magnet assembly is annular. Care has been taken to avoid the introduction of new matter. Claim 24 has been amended to correct grammatical errors. In view of the foregoing amendments and the following remarks, Applicants respectfully submit that all pending claims are in condition for allowance.

Drawings

As a preliminary matter, Replacement Drawings including Figs. 3A, 4A, 4B, 5A, and 5B were filed in the July 18, 2007 Amendment. The Applicants request that the Examiner acknowledge receipt of the Replacement Drawings.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-11, 13, and 15-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent Application No. JP 56-152963 (hereinafter Kobayashi) in view of Hedgcoth (U.S. Patent No. 4,894,133). As a preliminary matter, claims 10 and 19 were

cancelled in a previous amendment. It is respectfully submitted that the Examiner's rejection of claims 1-9, 11, 13-18, and 20 fails to set forth a prima facie obviousness case.

Amended claim 1 recites, in part, "...a first group of spaced-apart cathode/target assemblies comprising annular-shaped magnetron magnet assemblies."

The Office Action asserts that Kobayashi teaches a cathode sputtering apparatus and method for forming a uniform thickness layer on at least one surface of at least one workpiece in a multi-stage process including deposition of a plurality of sub-layers. The Office Action asserts that Kobayashi teaches a first group of spaced apart cathode/target assemblies (15, 16).

Turning to the prior art, Kobayashi states in the Constitution:

Substrate 20 is then shifted to a place concentric with a target 16, and a secondary sputtered film is deposited (*emphasis added*).

Kobayashi discusses the substrate 20 being moved to a place, which is concentric with the target (abstract). Kobayashi discusses the direction of the substrate's movement, not the annular shape of each cathode/target assembly. Kobayashi is *silent* regarding the annularly-shaped cathode/target assemblies having progressively increasing diameters.

Further, there is no teaching, suggestion, or motivation either implicitly or explicitly in Kobayashi of an annularly-shaped cathode/target assembly.

The only teaching of the claimed annularly-shaped cathode/target assemblies is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Examiner's retrospective assessment of the claimed invention and use of unsupported conclusory statements are not legally sufficient to generate a case of *prima facie* obviousness. The motivation for modifying the prior art must come from the prior art and must be based on facts. The Examiner is not free to ignore the

judicial requirement for **facts**. To do so is legal error. *In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002). Apparently, the Examiner has relied on improper hindsight reasoning in reaching the conclusion of obviousness.

Thereby as taught in the instant specification, the sputtered film thickness profile is a function of the diameter *d* of the annularly-shaped cathode/target assembly (*see, e.g.*, Para. [0067] of the Pre-Grant application). However, Kobayashi does not disclose or suggest this, and apparently is unaware of the unexpected improvement in overall sputtered film thickness provided by the claimed cathode sputtering apparatus.

Kobayashi fails to disclose or suggest, at a minimum, "...wherein the annular-shaped magnetron magnet assemblies have progressively increasing diameters," as recited in amended claim 1.

With respect to independent claim 13, the Office Action acknowledges that Kobayashi and Hedgcoth do not discuss depositing a perpendicular magnetic recording medium on a magnetically soft underlayer (claim 22).

Turning to the prior art, as stated above, Kobayashi is *silent* on a first group of spaced-apart including annularly-shaped magnetron magnet assemblies. Thus, Kobayashi fails to disclose or suggest, at a minimum, "...a first group of spaced-apart cathode/target assemblies comprising annular-shaped magnetron magnet assemblies," as recited in amended, independent claim 13.

Further, the Office Action acknowledges that Kobayashi and Hedgcoth do not discuss the magnetic soft under layer being 500 to 4,000 Å (claim 23). In the rejection of claim 23, the Office Action relies on Nasu in an attempt to cure the deficiencies of Kobayashi and Hedgcoth.

The Office Action asserts that Nasu teaches sputtering a magnetically soft underlayer and that the thickness can be 500 Å.

Turning to the prior art, Nasu describes forming a Fe-Co underlayer having a thickness in a range of 10-500 Å (col. 5, lines 30-34).

Dependent claim 23 recites, in part, "...forming an **about 500** to about 4,000 Å thick layer of the soft magnetic material."

Nasu states in col. 5, lines 35-38:

When the underlayer thickness is more than 500 Å, the coercive force is markedly lowered, while the in-plane squareness ratio is increased (*emphasis added*).

Thus, Nasu *teaches away* from "forming an **about 500** to about 4,000 Å thick layer of the soft magnetic material," as required in amended claim 23.

Claims 12 and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kobayashi in view of Hedgcoth, and further in view of U.S. Patent No. 5,441,615 (hereinafter Mukai). Claims 12 and 21 depend from claims 1 and 13, respectively, and include all of the features of their base claim plus additional features, which are not taught or suggested by the cited references. Therefore, for at least these reasons, it is respectfully submitted that claims 12 and 12 also are patentably distinguishable over the cited references.

Claims 22 and 23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kobayashi in view of Hedgcoth, and further in view of U.S. Patent No. 5,326,637 (hereinafter Nasu). Applicants respectfully submit that the rejection is moot in view of amendment cancelling claim 22. Further, dependent claim 23 is allowable at least for the same reasons as independent claim 13.

Claims 24 and 25 are rejected as being unpatentable over Kobayashi in view of Hedgcoth. The Office Action asserts that Kobayashi teaches a cathode sputtering apparatus for

forming a uniform layer of selected material on at least one substrate/workpiece. The Office Action states that Kobayashi teaches a group of spaced apart deposition stations (15, 16). The Office Action asserts that the stations have circular targets since the substrate is moved to be concentric with the targets (15, 16). The Office Action also asserts that each target can have a different size, such as, a diameter because of the concentric relationship between the target and substrate.

Turning to the prior art, Kobayashi states in the Constitution:

***Substrate 20 is then shifted to a place concentric** with a target 16, and a secondary sputtered film is deposited (*emphasis added*).*

Kobayashi discusses the substrate 20 being moved to a **place**, which is concentric with the target (abstract). Contrary to the Examiner's assertion, Kobayashi discusses the direction of the substrate's movement, not the shape of the magnetron magnet assemblies. Further, the Office Action acknowledges that Kobayashi does not discuss utilizing **a magnetron** for the targets. Kobayashi does not address the shape or the diameter size of the magnetron magnet assemblies. Kobayashi is *silent* on a first group of annularly-shaped magnetron magnet assemblies. Kobayashi is *silent* regarding each annularly-shaped magnetron magnet assembly having a diameter corresponding to a thickness profile for depositing the selected material.

Further, there is no teaching, suggestion, or motivation either implicitly or explicitly in Kobayashi of annularly-shaped magnetron magnet assemblies or their diameter corresponding to a thickness profile for depositing the selected material.

The only teaching of the claimed annularly-shaped magnetron magnet assemblies having a diameter corresponding to a thickness profile for depositing the selected material is found in Applicants' disclosure. However, the teaching or suggestion to make a claimed combination and the reasonable expectation of success must not be based on applicant's disclosure. *In re Vaeck*,

947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Examiner's retrospective assessment of the claimed invention and use of unsupported conclusory statements are not legally sufficient to generate a case of *prima facie* obviousness. The motivation for modifying the prior art must come from the prior art and must be based on facts. The Examiner is not free to ignore the judicial requirement for **facts**. To do so is legal error. *In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002). Apparently, the Examiner has relied on improper hindsight reasoning in reaching the conclusion of obviousness.

Thereby as taught in the instant specification, the sputtered film thickness profile is a function of the diameter *d* of the annularly-shaped magnetron magnet assembly (*see, e.g.*, pg. 18, lines 10-18 of the originally filed application). However, Kobayashi does not disclose or suggest this, and apparently is unaware of the unexpected improvement in overall sputtered film thickness provided by the claimed cathode sputtering apparatus.

Kobayashi fails to disclose or suggest, at a minimum, "...each annularly-shaped magnetron magnet assembly having at least one diameter corresponding to a thickness profile for depositing the selected material," as recited in amended claim 24.

New Claims

New claim 26 recites, "...the sputtering surface of at least one cathode/target assembly is located at a different spacing from a surface of the at least one substrate/workpiece than another of the cathode/target assemblies." Additionally, dependent claims 27-32 recite patentably distinguishing features of their own. It is submitted that these new claims distinguish over the cited references.

Conclusion

In view of the above amendments and remarks, Applicants submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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